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Exploring Factors Influencing Treatment Adherence in Women with Gestational Diabetes Mellitus: A Thematic Analysis

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ABSTRACT

Background & aim: Gestational Diabetes Mellitus (GDM) requires effective management through dietary changes, physical activity, and medications. Adherence to treatment is crucial, as poor adherence can lead to serious maternal and fetal complications. This study explored the factors influencing treatment adherence and compliance among women with GDM, building on prior evidence indicating low adherence levels in this population.

Methods: A qualitative study was conducted at a perinatal facility in Tamil Nadu, India, over six months. Purposeful sampling continued until data saturation, with 21 participants. In-depth, semi-structured interviews were held, and data was analyzed using conventional content analysis with a thematic approach.

Results: Two main themes affecting adherence emerged: 1) personal and family dynamics and 2) provision of health literacy. Personal and family dynamics included subthemes of perceptions of GDM, family support, roles and responsibilities, work-life imbalance, perceived control over self and family decisions, resource access, and prior diabetes exposure. Provision of health literacy emerged from two sub themes of the quality and adequacy of health literacy and challenges in communicating health information.

Conclusion: This study underscores the significant impact of both personal and family dynamics as well as health literacy on treatment adherence. Family factors, including perception of GDM, support, and responsibilities, greatly influence health management practices. Similarly, the quality of health literacy and effective communication of health information are critical for improving adherence. A holistic approach addressing both familial and systemic factors is essential to enhance treatment adherence and overall health outcomes for women with GDM.

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Introduction

Gestational Diabetes Mellitus (GDM) is a metabolic disorder with significant glucose intolerance and a subsequent rise in the plasma glucose level (1). Duration and severity of serum hyperglycemia influence the risk of complications. The Indian government promotes maternal health through policies including universal GDM screening in public and private facilities due to rising prevalence (2-3).

Traditional GDM treatment involves lifestyle modifications and pharmacotherapy if needed, with strict adherence crucial until glucose normalizes postpartum (1,4). Despite its importance, adherence is challenging. Lack of family support and misconceptions about physical activity hinder consistent dietary and

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lifestyle compliance (5). GDM management in India faces challenges like limited trained personnel, inadequate equipment, and low awareness and motivation among women and caregivers (6). Cultural norms and beliefs hinder effective GDM management (3). Sherin et al. (2025) highlighted that adherence depends on education, socioeconomic status, and regimen complexity (7). Al Nadhiri et al. (2023) found that self-efficacy, prior GDM history, management strategy, complication concerns, and spousal support enhanced adherence, while family/work responsibilities and time constraints were barriers (8). Carolan et al. (2012) reported that in Australia, motivators for GDM adherence included concern for the baby and family support, while barriers involved time constraints, social and physical limitations, inadequate information, and the nature of treatment (9). Ravel et al. (2023) identified key barriers to GDM adherence in Puducherry, India, including financial constraints, low awareness of medical nutrition therapy, and social pressures in joint family systems (10).

Women with GDM face challenges within patriarchal families, where support depends on influential members. When key relatives dismiss non-pharmacological management, it undermines adherence. Conversely, positive family attitudes toward diet and exercise enhance treatment compliance, highlighting the critical role of familial perception and support in managing GDM effectively (10–13). Sahu et al. (2021) identified delayed care, family duties, and poor infrastructure as key barriers to GDM treatment in India (14).

Previous studies have highlighted low levels of treatment adherence in women with GDM (11,15). A mixed-methods study explored GDM management gaps among women at 24–28 weeks gestation. Findings showed high carbohydrate intake, inadequate protein, fat, and fiber consumption, and poor physical activity adherence. Four key themes emerged: diet adherence, physical activity adherence, barriers, and suggested improvements for better treatment compliance (11). It is notable that factors affecting GDM treatment adherence in India are poorly documented; therefore this study exploresd the factors influencing treatment adherence among women with GDM at a perinatal facility in Tamil Nadu, India.

Materials and Methods

A qualitative study was undertaken to examine factors influencing treatment adherence among women with GDM in their second trimester at a tertiary healthcare center in Chengalpattu district, Tamil Nadu. Serving primarily rural populations, the center also treats urban clients. Inclusion criteria comprised women with GDM, a singleton pregnancy, and regular GDM care. Only those providing informed consent were included. Women with additional medical or obstetric complications were excluded due to their differing healthcare needs. The department of obstetrics admitted 150–200 women daily, providing a robust clinical setting for data collection and exploration of adherence behaviors within diverse socio-demographic contexts.

The study was conducted over six months, allowing for thorough data collection and analysis on adherence to the therapeutic regimen at a tertiary healthcare center. Purposive sampling was employed, and eligible participants were enrolled consecutively. Data saturation was reached after 21 interviews, with no new themes emerging.

A semi-structured interview guide facilitated data collection in a private outpatient setting to ensure comfort and confidentiality. One-to-one, in-depth interviews lasting 30–45 minutes allowed women to share their experiences regarding treatment adherence. Conducted in Tamil, the local language, interviews encouraged open, authentic communication in a culturally familiar context.

Brown and Clarke's (2006) thematic analysis was employed to analyze the interview data (16). RS conducted all interviews, with follow-up contact made only when clarification was needed. Each interview was recorded and transcribed verbatim to ensure accuracy. RS and HS independently reviewed transcripts multiple times to familiarize themselves with the data (Step 1). Thematic analysis was conducted manually, with coding carried out collaboratively (Step 2). Through in-depth exploration, related codes were grouped into themes (Step 3). These were then reviewed for

consistency and coherence (Step 4), interpreted in meaningful context (Step 5), and reported comprehensively to reflect key factors influencing GDM treatment adherence (Step 6). Credibility was ensured through prolonged engagement and member checking. Transferability was supported by detailed contextual documentation, while an audit trail enhanced dependability and confirmability, strengthening the study's overall trustworthiness (17).

Results

Most of the women with GDM were less than 35 years of age (95.2%). The majority of them resided in semi urban or rural locality (81%), and hailed from a joint family system (61.9%). A small proportion of them were primigravida (14.3%). All participants were provided with the opportunity for lifestyle modification through client health literacy, but not all applied these changes in their daily lives as per the recommendation.

Table 1. Characteristics of study participants

Characteristics	No (%)
Maternal age (year)[a]	
18-22	5 (23.8)
23-27	4 (19.0)
28-32	5 (23.8)
33-36	7 933.3)
Maternal educational level	
Primary	1 (4.8)
Secondary	1 (4.8)
Higher secondary	3 (14.3)
Undergraduate	10 (47.6)
Postgraduate	6 (28.6)
Educational level of the spouse	
Secondary	4 (19.0)
Undergraduate	12 (57.1)
Postgraduate	5 (23.8)
Employment status	
Employed	6 (28.6)
Homemaker	15 (71.4)
Residence	
Urban	4 (19.0)
Semi urban	10 (47.6)
Rural	7 (33.3)
Family history of diabetes mellitus	
Yes	12 (57.1)
No	9 (42.9)
History of GDM	
Yes	4 (22.2)
No	14 (77.8)
Not applicable	3
History of LSCS	
Yes	8 (44.4)
No	10 (55.6)
Not applicable	3
Gravidity	
1[b]	5 (23.8)
2	10 (47.6)
3	2 (9.5)
4	4 (19.0)
Parity	
0	3 (16.7)
1	8 (44.4)
2	7 (38.9)
Not applicable (Primi gravida)	3
Living child	
0	3 (16.7)
1	9 (50.0)
2	6 (33.3)
Not applicable (Primi gravida)	3
Abortion	
0	9 (50.0)
1	7 (38.9)
2	2 (11.1)
Not applicable (Primi gravida)	3
Intrauterine Death	
0	16 (88.9)
1	2 (11.1)
Not applicable (Primi gravida)	3
Perinatal status	
Antenatal (>38 weeks of GA)	11 (52.4)
Postnatal (within 1 week)	10 (47.6)

[a] Maternal age: Mean: 28; SD: 5.2

A total of 65 codes were identified, which were organized into nine subthemes, leading to the development of two overarching themes (Table 2). The two primary themes identified as influencing treatment adherence were "personal and family dynamics" and "provision of health literacy". Within the "personal and family dynamics" theme, the subthemes included "perceptions of GDM and its complications", "family support", "roles and responsibilities", "work-life imbalance", "perceived control over self and family decisions", "access to resources", and "prior exposure to diabetes". The subthemes under "provision of health literacy" were "quality and adequacy of health literacy" and "challenges in health literacy exchange".

Table 2. Subthemes and themes emerged from data analysis

Sub-Theme	Theme
Perceptions of GDM and its complications	Personal and family dynamics
Family support	
Roles and responsibilities	
Work-life imbalance	
Perceived control over self and family decisions	
Access to resources	
Prior exposure to diabetes	
Quality and adequacy of health literacy	Provision of health literacy
Challenges in health literacy exchange	

Theme 1: Personal and family dynamics

Family structure and relationships significantly impacted women's adherence to GDM treatment. In joint families, authoritative elders especially mothers-in-law often controlled food decisions, making dietary adherence difficult. This tension between familial hierarchy and personal health autonomy was a recurring challenge for participants. Supportive family dynamics, especially from spouses or members with diabetes experience, enhanced adherence by providing emotional encouragement and practical help, reducing isolation, and enabling women to prioritize their health effectively.

Sub-theme 1-1: Perceptions of GDM and its complications

Women with GDM predominantly reported stress-related reactions, including fear, anxiety, stress, disbelief, and sadness. A smaller group rationalized the condition and expressed confidence in managing the transient nature of GDM.

P6: "GDM is common during pregnancy and typically resolves after delivery. I'm confident in managing it because of the knowledge and resources available to me". (P6 was 28 years old and a homemaker)

Some were unaware of the underlying causes of GDM, while a few considered it a normal part of pregnancy and did not take it seriously. A small number acknowledged medically recognized factors contributing to GDM, such as poor dietary habits, reduced physical activity, and advanced maternal age.

Most respondents knew poor GDM control causes complications but couldn't specify maternal risks; few recognized fetal issues like macrosomia or anomalies.

P5: "I consistently follow my treatment plan to prevent congenital deformities, knowing uncontrolled GDM risks my baby's health. However, I remain uncertain about the full range of complications GDM may pose for both me and my baby". (P5 was 33 years old and a homemaker)

Sub-theme 1-2: Family support

Most respondents reported receiving adequate support from family members. Respondents who lacked adequate family support developed their own methods for managing GDM.

P9: "My family follows a routine of three varied meals daily, making it challenging to align my dietary needs with theirs. I often prepare meals that don't suit my restrictions and manage my blood sugar by adjusting portions and choosing low-carb options. While I prioritize my family's needs, I sometimes feel disheartened for not fully meeting my own nutritional requirements". (P9 was 21 years old and employed)

P11: "My mother-in-law thinks I'm overreacting to GDM, urging me to eat normally and avoid stress. Though well-intentioned, her advice overlooks the condition's seriousness. Lacking support, I've taken control by carefully managing my diet to regulate blood glucose. This self-regulation empowers me, despite going against her guidance". (P11 was 18 years old and a homemaker)

Sub-theme 1-3: Roles and responsibilities

Many participants managed their roles effectively with support from role substitutes like spouses, parents, or grandparents. In

contrast, those lacking such support struggled to balance responsibilities and adhere to the therapeutic regimen.

Sub-theme 1-4: Work-life imbalance

Working women with GDM faced adherence challenges due to work-life imbalance, long hours, limited meal breaks, and constrained opportunities for physical activity.

P8: "Balancing work and managing my gestational diabetes is challenging, especially since I have to travel for work. The constant juggling of preparing meals, monitoring my blood sugar levels, and sticking to my treatment plan while being on the go is overwhelming". (P8 was 33 years old and employed)

Sub-theme 1-5: Perceived control over self and family decisions

Most participants demonstrated an external locus of control, relying heavily on family members particularly dominant household figures for decisions regarding diet and physical activity. While healthcare providers offered guidance on lifestyle modifications, the influence of key family members often determined adherence. In contrast, women with an internal locus of control expressed greater confidence in independently managing their GDM, suggesting that personal agency significantly impacts treatment adherence. These findings highlight the dual importance of empowering women and involving influential family members to support effective gestational diabetes management.

P3: "I try to follow my doctor's advice and communicate it to my husband, but he often defers to his mother, who controls most household decisions, especially food. Even though I share my concerns, he prioritizes her views over mine. This makes it hard for me to stick to the diabetic diet. I feel unheard and unsupported, and it's frustrating and disempowering not to have control over something as crucial as my own health". (P3 was 22 years old and employed)

Sub-theme1-6: Access to resources

Few respondents noted that food accessibility and affordability significantly shaped dietary choices. Limited variety in village shops and financial constraints often led to prioritizing cheaper, less nutritious options despite awareness of healthier alternatives. This trade-off caused emotional distress, including frustration and guilt, potentially affecting glycemic control and well-being. These findings emphasize the importance of tailored dietary counseling that accounts for local food availability and economic realities. Integrating subsidized meal plans or community-based support systems in low-resource settings may enhance adherence to diabetes-friendly diets and alleviate the burden on women managing GDM under financial and emotional stress.

P4: "We mostly buy affordable vegetables, and rice is a daily staple. Many foods recommended for my diabetic diet are too expensive, so I often stick to what we can afford. I try to manage, but sometimes I feel I'm compromising my health due to financial limitations". (P4 was 36 years old and a homemaker)

P10: "Our local shop depends on nearby farmers, so the vegetable variety is limited. I often can't find the specific items needed for my diabetic diet, which makes it hard to follow my treatment plan". (P10 was 32 years old and a homemaker)

Sub-theme 1-7: Prior exposure to diabetes

A small proportion of the respondents had previous exposure to GDM. More than half had a family member with diabetes. These women found it easier to implement lifestyle changes, as their familiarity with diabetes helped them adapt to GDM management more effectively.

P2: "Since my mother-in-law has diabetes, she understands what I'm going through. Her advice and my family's support with household tasks make it easier for me to manage my health and stick to the treatment plan". (P2 was 20 years old and a homemaker)

Theme 2: Health literacy

Sub-theme2-1: Quality and adequacy of health literacy

Although all participants received information on GDM management and most felt the information was adequate, but still expressed a need for more detailed guidance on lifestyle modification. They specifically desired more practical advice on diet and physical activity, along with clear instructions on how to

incorporate these changes into their daily routines.

P2: "The doctor advised me to walk daily, but I wasn't given specific guidance on when to walk – morning or evening, the pace I should maintain, or how long I should walk. It would be much more helpful if practical, detailed tips were provided". (P2 was 20 years old and a homemaker)

Sub-theme2-2: Challenges in health literacy exchange

Many participants described difficulties in understanding health information due to the hurried nature of consultations in busy outpatient settings. Health literacy was often delivered quickly, with limited time for clarification or client engagement. As a result, participants reported an incomplete understanding of how to manage GDM effectively.

P7: "Doctors are often rushed in the outpatient department, so I sometimes leave without fully understanding my treatment plan. I wish I had more time to ask questions and clarify things". (P7 was 22 years old and a homemaker)

Discussion

This study explored the factors influencing adherence to treatment among women with GDM. The two major themes that emerged were "personal and family dynamics" as well as "provision of health literacy", which highlight the complex interplay between individual, familial, and systemic factors that shape treatment adherence. These findings underscore the importance of adopting a contextualized, culturally sensitive approach in supporting women with GDM, which is emphasized in previous research findings by Kandasamy et al. 2021 (18).

In terms of personal dynamics, it is noteworthy that woman diagnosed with GDM who receives clear, accurate information about the condition, its potential complications, and management strategies is more likely to stay motivated and adhere to her treatment plan. Her perception of the causes, treatment options, and long-term outlook is crucial in shaping her commitment to managing the condition effectively. Awareness of the possible severity and consequences of GDM can serve as a strong motivator, prompting her to take the necessary steps to safeguard both her health and that of her baby. Furthermore, accepting the diagnosis and having a comprehensive perception of the management plan are vital for successful GDM management (19).

Regarding family dynamics, it could significantly influencewomen's ability to adhere to GDM treatment plans. In joint family systems, hierarchical structures particularly the authoritative role of mothers-in-law often hinder dietary adherence, limiting women's autonomy despite their understanding of medical needs. This created a conflict between respecting family traditions and asserting health-related choices.

However, not all family influences were negative. In families with prior diabetes experience, women felt more supported and empowered, leading to improved adherence and reduced emotional burden. Practical help with chores and emotional encouragement, especially from spouses, further enhanced treatment compliance.

De Sequeira et al. (2019) emphasized the importance of involving family members in the management of GDM to ensure better adherence among South Asian immigrant women with GDM in Canada (20). Smyth et al. (2023) reported that the significance of support by spouses, along with the treatment team, significantly influenced treatment adherence among women with GDM in Ireland (21).

A study from Iran reported that factors such as the unexpected diagnosis of GDM, the urgency to make lifestyle changes, cravings for inappropriate foods, the sense of life being dominated by GDM, the desire to prevent complications, and the struggle to find balance all influenced treatment adherence (22). In contrast, participants in the current study felt that it was not GDM itself, but rather the controlling influence of key family members—often the head of the household—that dominated their lives. Unlike the cravings reported in the Iranian study, participants described challenges arising from family members consuming meals not suitable for diabetics in their presence, which made adherence more difficult. This behavior was

perceived as a lack of family adequate support in managing GDM.

Mukona et al. (2017) identified multiple barriers to effective diabetes management during pregnancy in Zimbabwe, including low socioeconomic status, insufficient support from family, peers, and the community, the physiological and emotional challenges of pregnancy, complex treatment regimens, the pathophysiology of diabetes, cultural and religious influences, and weaknesses in the health care system (23). Financial constraints and limited access to recommended foods further complicated adherence. Many participants reported relying on affordable staples like rice and locally available vegetables, which did not always align with their dietary guidelines. These findings point to the need for economically viable and locally relevant dietary counseling, particularly in rural areas where access and affordability are major concerns.

Provision of health literacy was the second theme of this study's findings. Healthcare providers served as the primary source of health literacy and guidance for GDM management. However, the structure and delivery of health literacy posed significant limitations. Karan et al. (2021) emphasized the importance of strengthening the healthcare workforce in India (24). WHO (2019) reported the deficit in the Indian health workforce (25). Women described overcrowded outpatient departments and brief consultations, which hindered their understanding of treatment instructions. As a result, many felt uncertain about critical aspects of their care and lacked the confidence to ask follow-up questions or seek clarification.

While all participants received some form of health literacy on lifestyle modification, most found it too generic or rushed, lacking the practical detail needed to implement changes in daily life. India faces a critical shortfall in healthcare workforce availability, with 8.8 doctors and 17.7 nurses per 10,000 population, far below the WHO's recommended ratio of 44.5 per 10,000 (24,25). This inadequacy poses a major challenge to delivering high-quality, individualized care. In the case of GDM, this shortage affects the ability of healthcare providers to offer comprehensive counseling and follow-up support, which are vital for promoting adherence to lifestyle interventions. Overburdened clinics, brief consultations, and high client volumes contribute to gaps in client health literacy, leaving women under-informed and under-supported in managing their condition effectively.

Individualized guidance from trained diabetes educators or community health workers spending more time with clients aligns with findings by de Sequeira et al. (2019) (20) and Carolan-Olah et al. (2017) (26) highlighting the importance of tailored interventions in the effective GDM management. Health literacy should holistically address all aspects of pregnancy, not just GDM, by offering clear, evidence-based information on prenatal care and potential complications. It must be freely available, easily accessible, and tailored to the user's cognitive level to ensure clarity and relevance. Importantly, a feedback mechanism should be integrated within healthcare services to verify that information has been understood and effectively applied. Such a comprehensive, user-centered approach empowers expectant women to make informed decisions and promotes better maternal and fetal health outcomes throughout pregnancy.

Furthermore, the influence of key family members on treatment adherence suggests that health literacy should extend beyond the individual to include family-oriented counseling, especially in patriarchal or joint-family settings where women may have limited decision-making power.

This study offers rich insights into rural Indian women's GDM experiences, highlighting familial and systemic barriers through authentic verbatim narratives for holistic understanding. However, the study findings are limited by a small sample from a single region, reducing generalizability. Self-reported data may involve recall or social desirability bias. Excluding family and healthcare provider perspectives may limits insights into familial dynamics and systemic healthcare challenges.

Conclusion

This study highlights that GDM treatment adherence is shaped by personal, familial, and healthcare factors. In joint families, hierarchical dynamics limit women's autonomy over diet and activity. Barriers include resource

constraints, domestic duties, and external control beliefs. The findings emphasize culturally sensitive, family-inclusive care with health literacy, counseling, and affordable diets to overcome sociocultural and systemic obstacles for equitable diabetes management during pregnancy. Integrating family-centered health literacy and training community health workers in GDM counseling can improve adherence. Local food-based dietary plans and decentralized services like mobile clinics, health cafés, and group sessions enhance care access. Future research should triangulate perspectives, compare rural-urban differences, test community interventions, and explore postpartum adherence and long-term complications through longitudinal studies.

Declerations

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

The study ensured no prior participant-researcher relationships to uphold methodological rigour and ethical standards. Participants gave informed, voluntary consent, with assured confidentiality and the right to withdraw any time without consequences.

Code of Ethics

Ethical clearance was obtained from the SRM IST Institutional Ethics Committee.

Use of Artificial Intelligence (AI)

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Authors' contribution

RS and NBD designed the study and collected data. RS and HS analysed and interpreted findings. RS drafted the manuscript, while NBD and HS critically reviewed it. All authors approved the final version.

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